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GEOLOGY OF THE COAL RESERVE IN THE QUINSAM MINING BLOCK

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Submitted by:
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1.0 SUMMARY

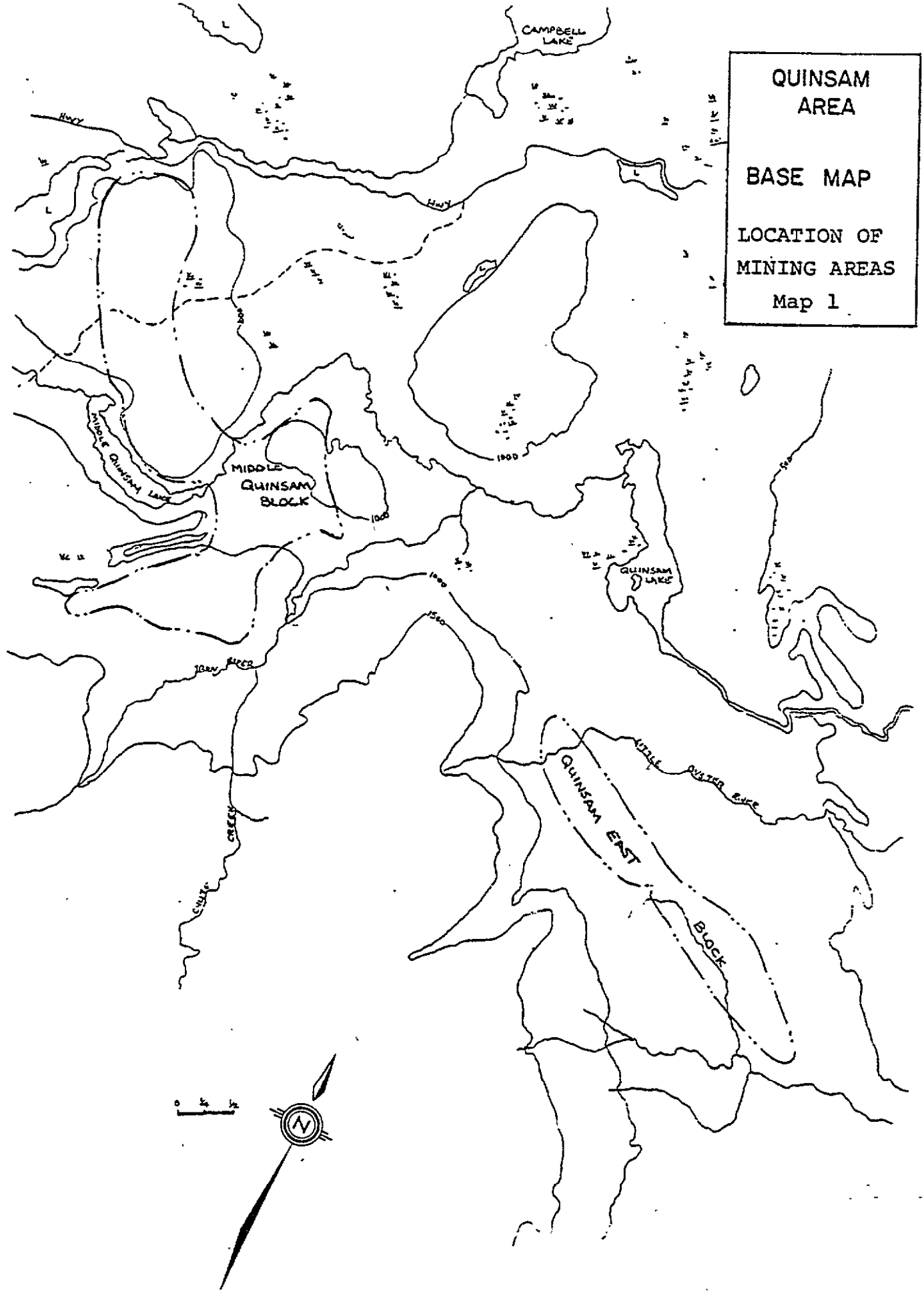
The Quinsam mining block occurs along a plateau extending southward from Gooseneck Lake to the Iron River. The plateau is situated seventeen miles west of the Campbell River town site. The Quinsam East Mining block is located south and east of the major mining block, but occurs in the same stratigraphic horizon.

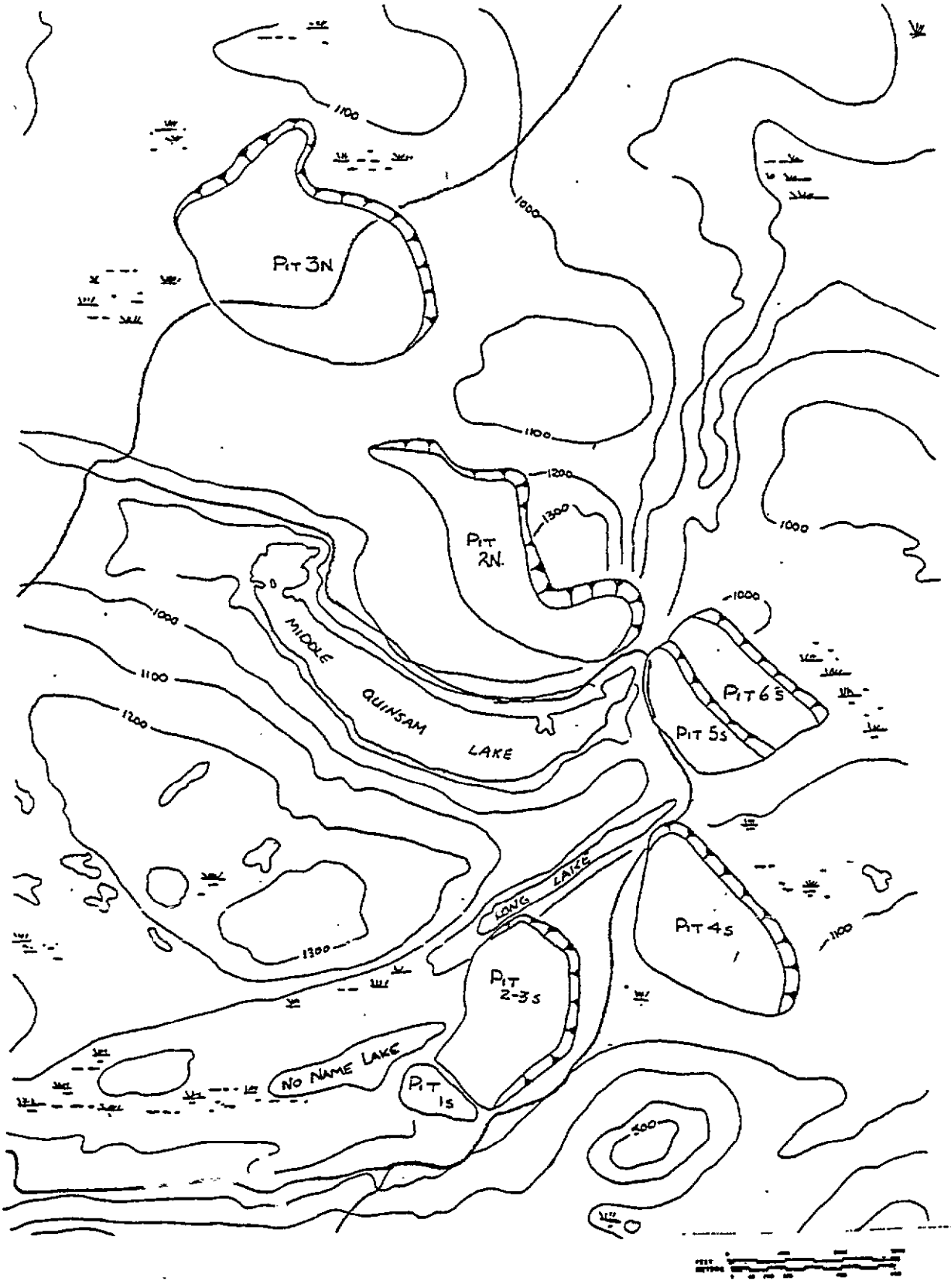
The economic coal seams occur in gently warped and tilted fault blocks, separated by high angle normal and reverse faults that originate in the basement rocks. Four seams are present in the Middle Quinsam and Quinsam East blocks. The seams in these areas may be related stratigraphically but have different depositional characteristics.

1.1 Summary of In-Place Coal Reserves

	Geological Reserves (Million Tons)	Scheduled Reserves (Million Tons)
Pit 1S	0.43	0.41
Pit 1N	1.15	--
Pit 2N	2.54	2.10
Pit 2/3S	2.86	2.61
Pit 3N	5.08	5.57*
Pit 4S	2.34	1.87
Pit 5S	0.51	0.51
Pit 6S	1.14	1.03
Pit 7S	4.65	3.52
Area Between 4 & 5/6S	0.92	--
Quinsam East	5.[illegible]	--
Total	27.09	17.62

*Scheduled reserves include coal over the 200 foot highwall.


QUINSAM
AREA
BASE MAP
LOCATION OF
MINING AREAS
Map 1
CAMPBELL
LAKE
HWY
HWY
MIDDLE QUINSAM LAKE
MIDDLE
QUINSAM
BLOCK
1000
1500
QUINSAM
LAKE
QUINSAM EAST
BLOCK
LITTLE
QUINSAM RIVER
QUINSAM
RIVER
QUINSAM
CREEK
0
½
1½
N



PIT LOCATION PLAN

All geological in-place reserves were calculated for a 200 foot highwall. Scheduled reserves for Pit 7 are composed of the following:

a. Pit 7A - 0.36 Million Tons
b. Pit 7B - 0.30 Million Tons
c. Pit 7C - 2.86 Million Tons*

*Estimated scheduled in-place tons 85% of geological in-place tons.

1.2 Distribution of Coal Quality

The proportional distribution of seam used for this analysis is as follows:

Seam 1N - 39.8%
Seam 1S - 16.8%
Seam 2 - 7.1%
Seam 3 - 33.0%
Seam 4 - 3.3%

Proximate Analysis
Dry Basis

		Mean	Range of Mean 95% Confidence
Ash	dry basis	17.59	15.39 to 19.80
Volatile Matter	dry basis	38.75	37.64 to 39.88
Fixed Carbon	dry basis	45.95	44.15 to 47.75
Sulphur	dry basis	1.65	1.35 to 1.96
BTU/lb.	dry basis	11,506	11,156 to 11,857

As Received @ 10% Moisture

		Mean	Range of Mean 95% Confidence
Residual Moisture (air dry basis)		2.30	2.04 to 2.56
Ash	as received basis	15.36	13.85 to 17.82
Volatile Matter	as received basis	34.86	33.88 to 35.89
Fixed Carbon	as received basis	41.86	39.74 to 42.98
Sulphur	as received basis	1.49	1.21 to 1.76
BTU/lb.	as received basis	10,355	10,040 to 10,674

2.0 PHYSIOGRAPHY

The Quinsam property, which consists of a series of low rolling hills separated by narrow valleys, forms part of the Nanaimo Lowlands belt. It is bound to the west by the Insular Mountain Range and to the east by the Straits of Georgia. Elevations increase inland from the coast to a maximum of 2,000 feet A.S.L.

Two major river systems drain the area, each flowing in a north-easterly direction to the Straits of Georgia. The Middle Quinsam area is drained by the Quinsam and Iron Rivers, the east block is drained by the Woodhus Creek flowing into the Oyster River.

The area is covered by a dense growth of vegetation, typical of the northwest Pacific rain forest. The forested areas consist primarily of Douglas fir with minor Hemlock, Cedar and Spruce. Low bushes and shrubs comprise the undergrowth.

Elevation and proximity to the ocean have a marked influence on seasonal climatic variations. Annual rainfall varies from 40 to 58 inches. Seventy-five percent of this precipitation occurs within the six month winter season and in the higher regions falls as snow.

3.0 GEOLOGY

Coal seams of economic importance occur in the Late Cretaceous Comox Formation. This sedimentary sequence was deposited in a basin bound to the west by Late Cretaceous granitic intrusives and to the south and east by rocks of the Early Cretaceous Vancouver Group. The Vancouver Group also forms the unconformable floor on which the sediments were deposited. The Comox Formation forms a wedge of sediments, thickening to the northeast. A steady subsidence of this wedge of sediments has insured the preservation of several peat deposits which formed laterally persistant coal measures.

The Comox Formation reflects the regional tectonism in the amount of faulting and fracturing that has taken place. These sediments have been cut by several major faults, trending east-west and northwest-southeast and by their associated transverse faults, producing a series of northeast dipping fault blocks.

Pleistocene deposits, over the Middle Quinsam area vary in thickness from 0 to over 150 feet. Structurally weak areas, such as fault zones and formation contacts become deep erosional channels, due to glacial scouring. (See Glacial Overburden Isopach Appendix 5.) With later retreat of the glaciers these channels became filled with till. Till to a depth of 150 feet has been encountered within the fault zone between Pit 2N and 3N. Thick till formations are also found along the contact between the Comox Formation and the granitic intrusion to the west. Another such area is over the major northeast-southwest trending fault that occupies the Quinsam River Valley on the

east side of Pit 7. This variation in till covering exists over the Quinsam east block. The exception being in the east block till coverage is Glacio-Fluvial as opposed to Ground Morain deposits in the Middle Quinsam area. Generally, till cover consists mainly of boulder till with a sand and clay matrix. Occasional lenses of loose sand and gravel were encountered in drilling.

3.1 Stratigraphy

The coal measures occur in the lowermost Comox Formation, which consists of two depositional cycles in the Middle Quinsam area. The upper cycle consists primarily of granitic derived medium to coarse grained white to brownish grey, arkosic sandstone. The lower cycle consists of finer grained siltstone, mudstone and sandstone derived from the underlying Vancouver Group. (See Table 2.)

Economic coal occurs in both cycles, with the No. 1 and No. 2 seams occurring in the lower cycle and No. 3 and No. 4 seams occurring in the upper cycle. (See Diagram 1.)

The lowermost sediments of the lower cycle rest unconformably upon the Vancouver Group. They consist of a series of siltstone, mudstone and sandstones ranging in colour from rust to green to dark brown and are fine grained. The No. 1 and No. 2 seams lie within this sequence. The irregular paleotopography of the Vancouver Group occasionally inhibits the deposition of the lowermost portion of the cycle and consequently the deposition

Table 1

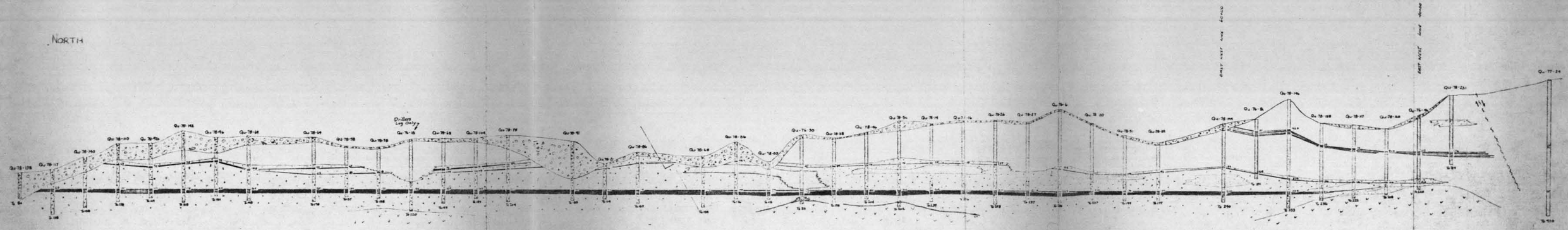
Table of Formations

Period	Formation	Lithology
Recent	Alluvium	Fluvitile sands and gravels, clays, weathered bedrock
Pleistocene	Glacial till and outwash	Stratified sands and gravels compacted clay-rich boulder till
	Unconformity	
Tertiary	Plutonic Stocks Igneous Sills and Dykes	Porphyritic dacite, quartz diorites and related breccias
	Unconformity	
Cretaceous	Comox Formation	Arkosic sandstone, minor siltstone, mudstone, conglomerate and coal seams
	Unconformity	
Cretaceous Jurassic	Coast Intrusives	Granodiorite, minor quartz diorite
	Unconformity	
Jurassic Triassic	Vancouver Group	Amygdaloidal pillow basalt, andesitic tuffs and breccia, minor limestone and argillites

Table 2

Stratigraphic Column
Comox Formation
Quinsam Coal Project
Middle Quinsam Basin

Unit	Thickness	Lithology
Glacial Till	0–15'	Compacted and cemented clay with boulders.
		Sandstone, m.-gr., arkosic.
No. 3 SEAM	12'–15'	6.0'–10.0' coal with 3 partings.
	100'–130'	Sandstone m.-cs. gr. arkosic massive, minor siltstone and mudstone partings.
No. 2 SEAM	1'–5'	1.0'–4.5' coal with 1 parting.
	60'–80'	Interbedded dk. grey siltstone with greenish grey sandstone.
No. 1 Rider	1.0'–2.0'	1.0'–1.5' coal.
		Mudstone.
No. 1 SEAM	10'–16'	6.5'–12.0' coal with 3 minor partings.
	0'–60'	Primarily dk. grey siltstone with green sandstone lenses, red siltstone at base.
Vancouver Gp.		Metavolcanics argillites.



LONGITUDINAL SECTION
DATUM # 1 SEAM
SECTION 20+00 - 18+00
Vert. Scale: 1"=200'

Diagram 1

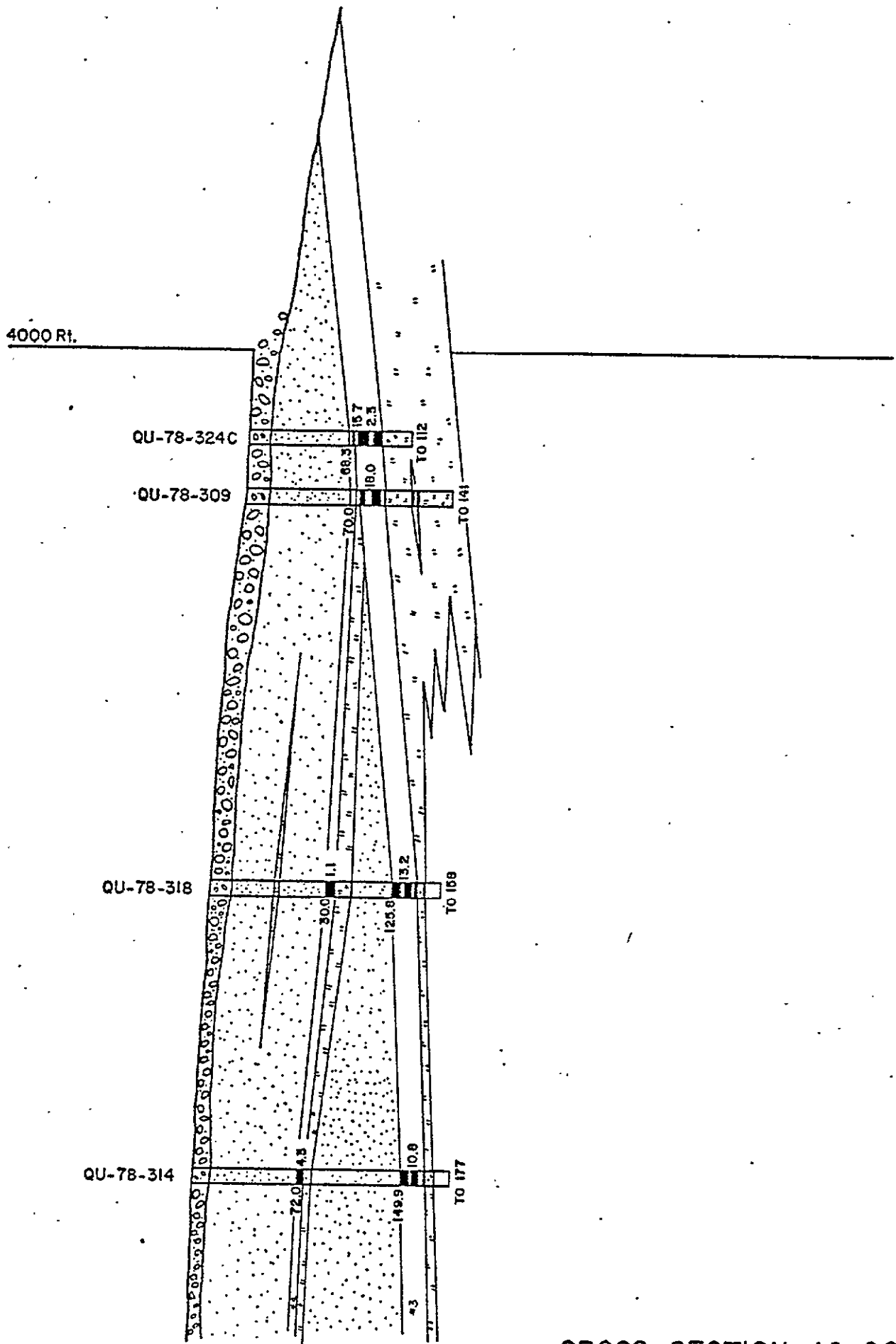
of the No. 1 seam. This seam consists of 6 to 12 feet of coal with occasional mudstone or bone partings. The No. 1 seam thickens in the south and central areas and thins and splits north of Line 170+00.

Approximately 70 feet of sediments occur between the No. 1 seam and the No. 2 seam. The No. 2 seam is deposited within a dark brown siltstone and usually consists of two coal seams split by a small mudstone parting. The top of the mudstone above the No. 2 seam marks the division of the two depositional cycles.

The sediments above this mudstone consist largely of fairly homogeneous, medium to coarse grained arkosic sandstone occassionally interbedded with thin beds of siltstone and mudstone.

Seam No. 3, which lies 100 to 150 feet above the No. 2 seam, consists of 6 to 10 feet of coal with up to 3 mudstone partings. In the southern area these partings are a medium grained sandstone. Seam No. 3 shows great lateral variation over short distances, but consistently shows a high sulphur value.

In the southeastern portion of the pit, the No. 4 seam occurs above the No. 3 seam; towards the eastern subcrop edge, the No. 4 seam merges with the No. 3 to form a single zone split by a small mudstone parting. (See Diagram 2.) The No. 4 seam sits on a thin bank of dark brown mudstone and is truncated by a thick sequence of grey medium grained sandstone.



CROSS-SECTION 46+00

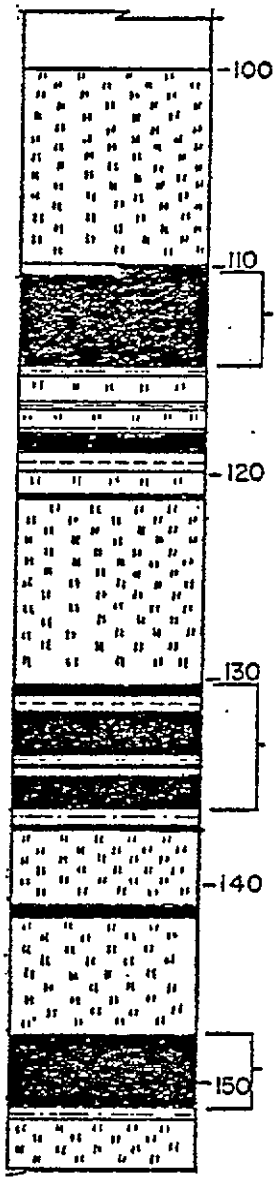
Diagram 2

In the Quinsam east block the uppermost coal horizon (Table 3) is a thick succession of siltstone-mudstone interbedded with coal. Within this horizon there are three continuous coal zones separated by siltstone and mudstone partings with the thickness varying from northeast to southeast. (See Diagram 3.) The coal seams themselves have great lateral variation, thinning and splitting away from basin edge. The coal succession is immediately capped by a competent fine grained, medium grey siltstone overlain by the normal succession of sandstone interbedded with siltstone.

The lowermost coal seam is seated on a medium hard, fine grained grey brown siltstone, which was deposited upon a cobble conglomerate. (See Diagram 4.) The coal horizon is made up of coal seams ranging in size from 3 feet to less than 1 foot, interbedded with hard to medium hard shales and is capped by a succession of sandstones with minor lenses of siltstone. The E-log signature of the lowermost seam is very unusual, with the uppermost coal bank having a very high gamma response.

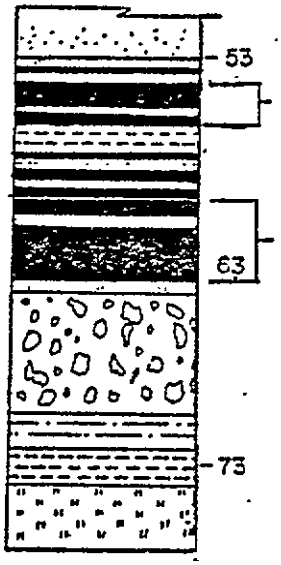
Coal in the lowermost cycle of the Middle Quinsam area was deposited in paralic basins bound by topographic highs formed by the Vancouver Group. The coarsening of detrital sediments of the upper cycle indicates that this coal was deposited in a system of higher energy, possibly a large estuary system. The lack of seat earth suggests an allochthonous type of deposit, or coals formed from plant remains which were transported from their original site.

LQ-77-91C



Stratigraphic Column
Quinsam East
Table 3

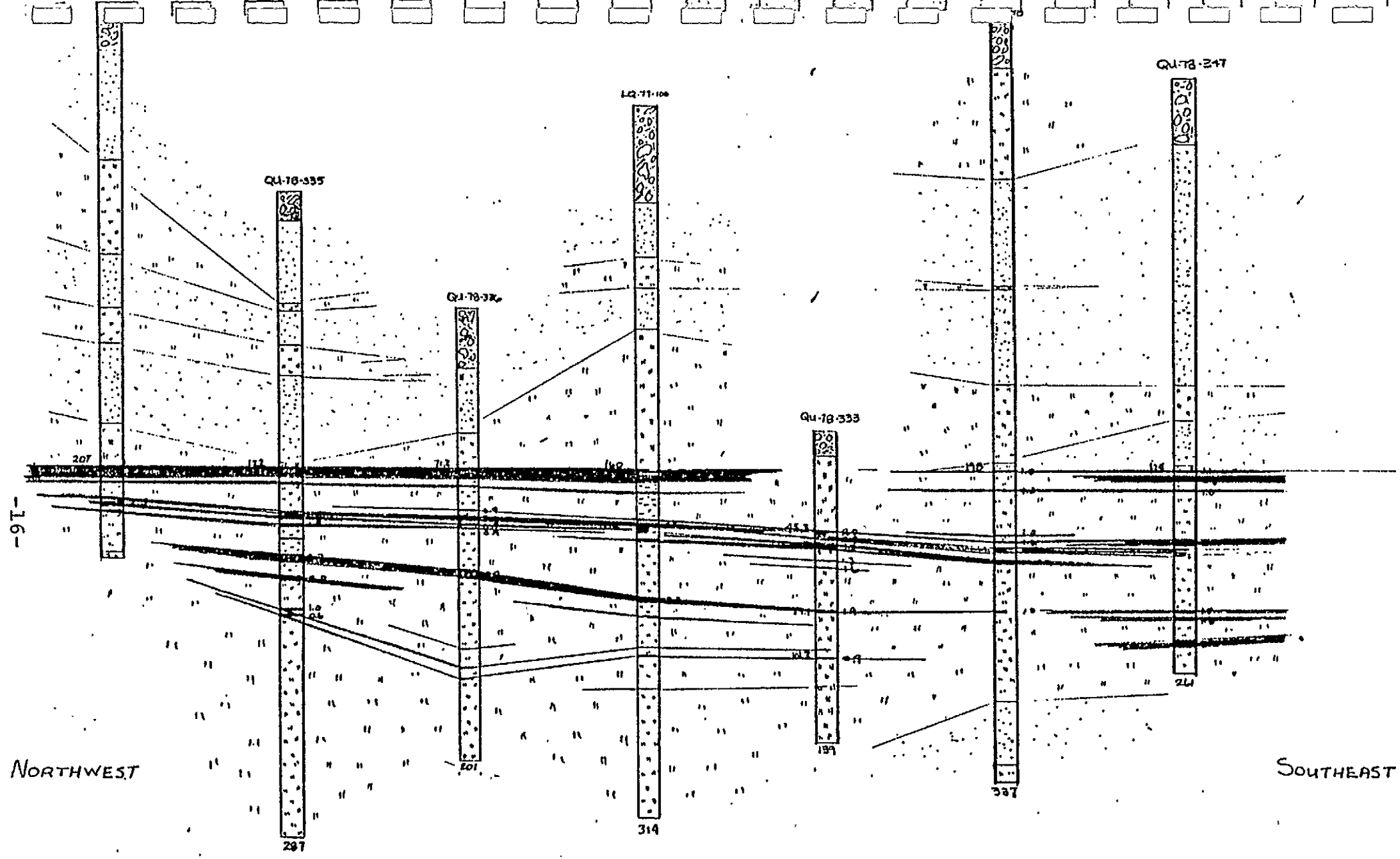
LQ-77-74C



LITHOLOGY

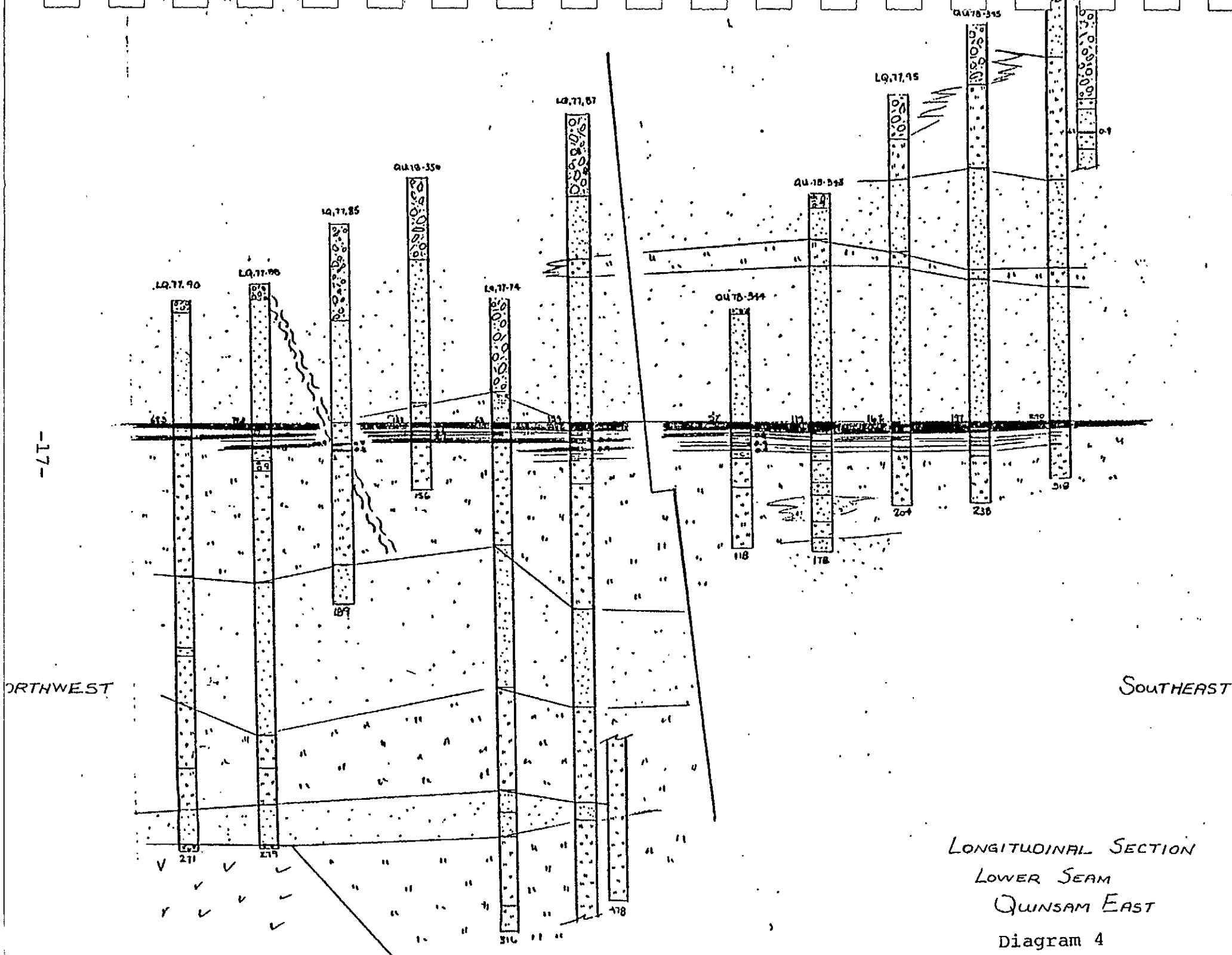
- COAL
- COALY SHALE
- SHALY COAL
- SANDSTONE
- SILTSTONE
- SHALE
- MUDSTONE
- CONGLOMERATE

NOTE: RESULTS ON AIR DRY BASIS.



LONGITUDINAL SECTION
UPPER SEAMS
QUINSAN EAST

Diagram 3



LONGITUDINAL SECTION
LOWER SEAM
QUINSAM EAST

Diagram 4

In the east block coal was possibly deposited in marginal basins of an Alluvial-Delta system. This is indicated by numbers and variations of coal bands, caused by repeated build up and destruction of marginal sand bars.

3.2 Structural Geology

Within the Middle Quinsam area the Comox Formation occurs in a single basin disrupted by major normal faults. Subsiduary faulting has produced a series of down faulted blocks trending northwest and dipping from 5° to 20° northeast.

The predominant style of faulting is that of high angle brittle fracture with displacements ranging from over 300 feet on major faults to less than 5 feet on some of the subsiduary faults.

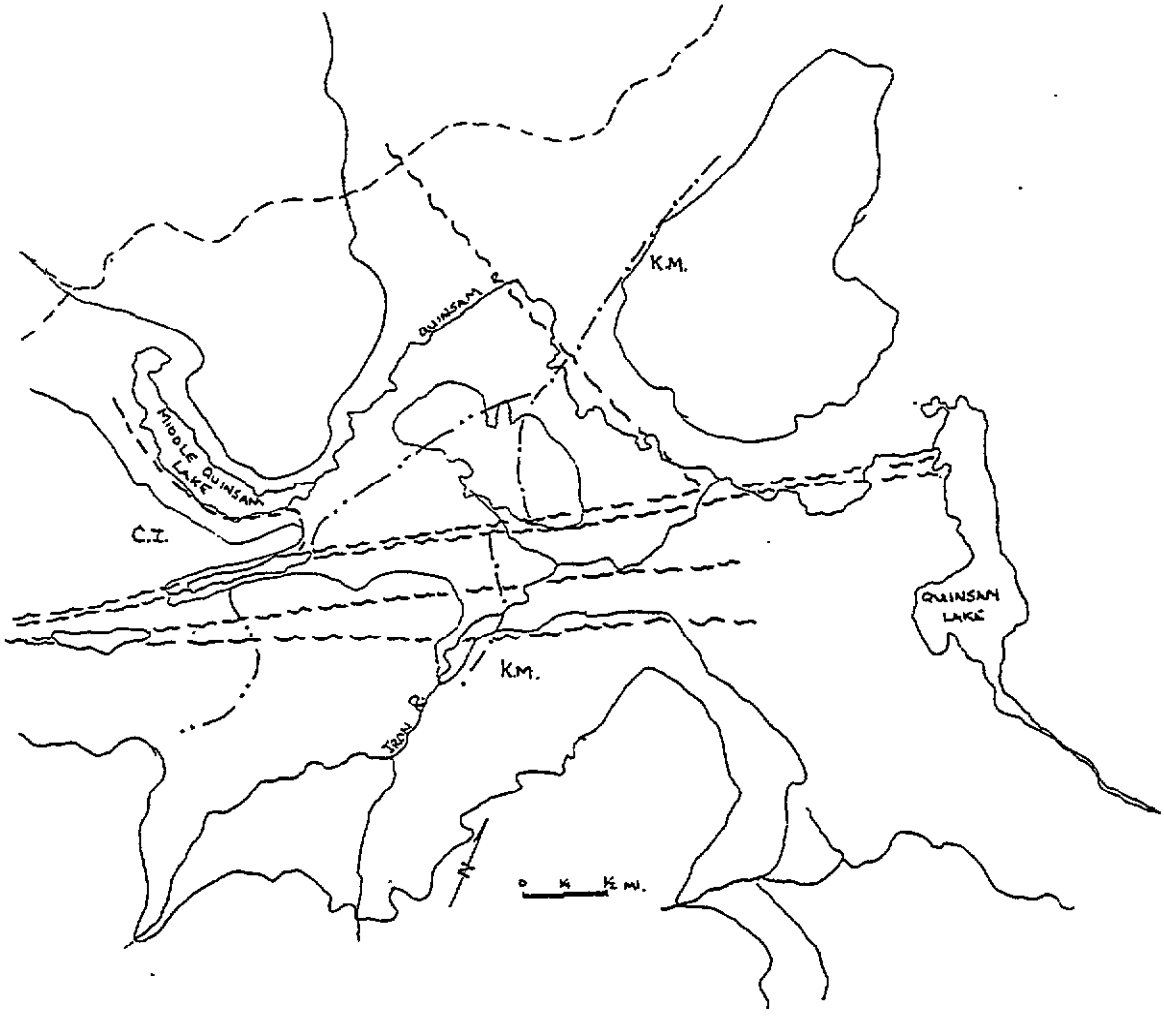
In the south block a set of major east-west transverse faults have cut the Comox Formation parallel to Long Lake. This lake and the lake to the immediate southwest were created by a series of faults, producing a graben structure or a depression, which was subsequently filled with till and water. These major fault systems have vertical displacements of over 150 feet and known horizontal displacements of over 300 feet. Subsiduary faulting has created numerous blocks, between and adjacent to the two major fault zones. These blocks dip to the east and southeast at varying degrees. Movement in the Vancouver Group has caused minor reverse faulting on the compressional limb of a basement high. This can be seen in Section 20+00 to 30+00 of Pit 4 south. This paleotopographical high, which covers the

total east half of the south block has eliminated the deposition of the No. 1 seam. This same paleotopography exists in the central block across the Long Lake fault zone. In this block the basement high exists in the south half, detering deposition of the No. 1 seam. (See Diagrams 5 and 6.) Possible displacements of up to one quarter of a mile could exist along the Long Lake fault zone as indicated by the reconstruction of the basement high.

Pit 5, 6 and Pit 7 are on opposite limbs of a syncline that plunges to the north. Each limb of the syncline is an upthrown block that has a shallow dip towards the centre of the syncline. Faulting within these blocks has not been extensive.

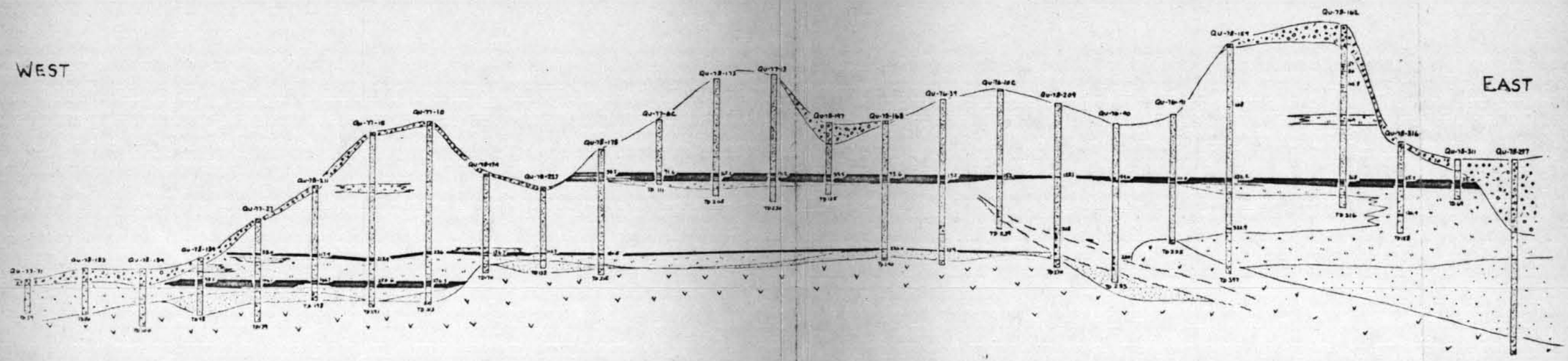
In the northern blocks a series of relatively closely spaced, high angle, normal faults trend to the northwest and dip at about 60°. These faults are sub-parallel to each other and generated in the basement by granitic uplift.

The No. 1 seam in Pit 2N has also been affected by a small paleotopographic high in the Vancouver Group, reducing it to a 3 foot seam in the highwall area of Line 87+50. This seam also shales out to the north of Line 180+00.



Represents Area of Basement High
Vancouver Group
Coast Intrusions

WEST



EAST

SECTION 40+00
ALL SEAMS USED AS DATUM
Horizontal Scale: 1"=200'

Diagram 6

4.0 Quality

Table 4
Summary of Quality Variations on a Dry Basis

	Core Samples		Bulk Sample
	Mean	Range (95% Confidence)	
Seam No.1 North			
Ash	13.17	12.05 to 14.29	13.87
Volatile Matter	37.10	36.59 to 37.61	35.62
Fixed Carbon	49.83	49.14 to 50.52	50.51
Sulphur	0.71	0.56 to 0.85	0.47
Btu/lb.	12115	11946 to 12284	12125
	Core Samples		
	Mean	Range (95% Confidence)	Bulk Sample
Seam No.1 South			
Ash	19.72	17.57 to 21.85	17.06
Volatile Matter	35.29	34.50 to 36.10	35.46
Fixed Carbon	45.32	44.02 to 46.62	47.48
Sulphur	1.07	0.91 to 1.24	1.18
Btu/lb.	11278	10927 to 11628	11864
	Core Samples		
	Mean	Range (95% Confidence)	Bulk Sample
Seam No.2			
Ash	16.50	14.49 to 18.57	12.77
Volatile Matter	37.77	37.18 to 38.36	35.99
Fixed Carbon	45.74	44.25 to 47.23	51.23
Sulphur	2.56	2.10 to 3.02	2.49
Btu/lb.	11746	11433 to 12059	12610
	Core Samples		
	Mean	Range (95% Confidence)	Bulk Sample
Seam No.3			
Ash	22.21	19.97 to 24.46	26.69
Volatile Matter	35.45	34.45 to 36.45	31.07
Fixed Carbon	43.43	40.88 to 45.98	42.24
Sulphur	2.63	2.23 to 3.05	1.89
Btu/lb.	10850	10508 to 11191	10387

Table 4 (continued)
Summary of Quality Variations on a Dry Basis

	Core Samples		Bulk Sample
	Mean	Range (95% Confidence)	
Seam No.4			
Ash	27.66	22.01 to 32.92	
Volatile Matter	33.94	31.79 to 36.08	
Fixed Carbon	38.61	35.67 to 41.53	
Sulphur	3.77	3.13 to 4.41	
Btu/lb.	10052	10928 to 9175	

5.0 RESERVES

The in-place surface recoverable coal reserves were calculated under the following parameters.

1. Coal thickness is based on the in-place raw coal within each seam, excluding partings.

2. The in-place density of the raw coal is 1.2 tons/cu. yd.

3. Seams less than 3 feet were not considered economical in the following three standard categories:

   0 to 120 feet of overburden
   120 to 160 feet of overburden
   160 to 200 feet of overburden.

Table of In-Place Reserves for Scheduled Pits

Pit No.	Reserve Category	Average Raw Coal Thickness (Feet) Seam 1	Seam 2	Seam 3	Reserve Tonnage ($X 10^6$) Seam 1	Seam 2	Seam 3	Overburden Volume ($X 10^6$)	Ratio
Pit 1S	0-120	14.97			0.43			0.53	1.2:1
Pit 2N	0-120	10.10	1.30		0.83	0.11		5.82	7.5:1
	120-160	9.10	1.30		0.66	0.09		8.50	13.7:1
	160-200	8.90	1.30		0.74	0.11		12.53	17.7:1
Pit 2-3S	0-120	12.83	3.53		1.20	7		4.69	3.9:1
	120-160	12.68	3.10		0.60			5.51	9.2:1
	160-200	10.84	4.23		0.49			6.81	13.7:1
Pit 3N	0-120	9.43			0.99			8.35	8.4:1
	120-160	9.73	2.83		1.04	0.30		12.42	9.3:1
	160-200	9.70	3.10		2.08	0.67		32.23	11.7:1
Pit 4S	0-120			8.40			1.47	10.86	7.4:1
	120-160			9.30			0.41	5.73	14.0:1
	160-200			10.00			0.47	7.56	16.3:1

Pit No.	Reserve Category	Average Raw Coal Thickness (Feet) Seam 1	Seam 2	Seam 3	Reserve Tonnage ($\times 10^6$) Seam 1	Seam 2	Seam 3	Overburden Volume ($\times 10^6$)	Ratio
Pit 5S	0-120	7.73			0.20			1.27	6.5:1
	120-160	7.73			0.15			2.30	15.1:1
	160-200	7.73			0.17			3.30	19.4:1
Pit 6S	0-120			7.30			0.78	5.31	6.3:1
	120-160			7.80			0.24	3.66	15.0:1
	160-200			8.30			0.12	2.18	18.1:1
Pit 7A	0-120			14.75			0.34	1.62	4.8:1
	120-160			14.75			0.19	1.47	7.7:1
	160-180			14.70			0.23	2.31	10.0:1
Pit 7B	0-120			12.35			0.26	1.50	3.8:1
	120-160			11.20			0.15	1.47	10.5:1
	160-200			11.00			0.14	1.85	13.2:1
Pit 7C	0-120			11.25			0.90	5.20	5.8:1
	120-160			10.80			0.97	10.89	11.2:1
	160-200			11.33			0.82	11.40	13.9:1

Pit No.	Reserve Category	Average Raw Coal Thickness (Feet) Seam 1	Seam 2	Seam 3	Reserve Tonnage ($\times 10^6$) Seam 1	Seam 2	Seam 3	Overburden Volume ($\times 10^6$)	Ratio
Pit 7C	0-120	3.65 (Seam 4)					0.66	11.74	17.8:1
	120-160	3.65 (Seam 4)					0.21	0.66	3.1:1
TOTAL							19.21	189.67	9.9:1

Coal reserves in areas other than scheduled pits:

1.	Area between Pit 2N and 3N	1.15 Million Tons
2.	Area between Pit 5-6S and 4S	0.67 Million Tons
3.	Area directly north of Pit 4S	0.25 Million Tons
	TOTAL	2.07 Million Tons

6.0 CONCLUSIONS

In August 1976, Luscar Ltd. entered into an agreement with Weldwood of Canada Ltd. to conduct a geological exploration program in the Quinsam area. Between that date and the present a total of 451 drillholes and 103 coreholes have been drilled. This drilling has delineated a geologic in-place reserve of 27.09 million tons, of which 17.62 million tons have been scheduled to be mined. Thus far, washability studies conducted indicate that greater than 90% of the raw coal can be recovered at less than 10% ash, with a calorific value ranging from 12,500 to 13,000 BTU/lb.

This coal is classified as a high volatile, bituminous "A" steam coal with the following analytical characteristics on a dry basis:

Ash	17.59
Volatile Matter	38.75
Fixed Carbon	45.95
Sulphur	1.65
BTU/lb	11,506

At present, washability tests are being conducted on the 29 coreholes drilled in 1979. This information will be reported on at a later date.

Appendices

SUMMARY OF SEAM #1 RIDER

CORE ANALYSIS

Lab No.	Corehole No.	Moisture	Ash	Volatile Matter	Fixed Carbon	Sulphur	BTU/lb.	F.S.I.
311	QU-78- 6(C)	1.74	22.41	36.63	39.23	8.32	10,375	
314	QU-78- 9(C)	1.88	19.85	37.86	40.31	3.02	10,635	
316	QU-78-13(C)	1.71	21.80	37.75	38.74	3.02	10,421	
318	QU-78-16(C)	1.80	20.37	36.78	41.05	6.22	10,827	
320	QU-78-21(C)	1.89	22.20	35.92	39.99	5.68	10,522	
323	QU-78-27(C)	1.96	18.47	36.75	42.82	4.70	11,310	
327	QU-78-30(C)	2.93	13.69	39.65	43.73	2.88	11,347	
329	QU-78-31(C)	1.71	21.70	37.92	38.67	8.62	10,845	
379	QU-78-39(C)	2.75	14.86	36.80	45.59	3.12	11,741	
381	QU-78-44(C)	2.34	29.17	33.98	34.51	6.13	9,341	
383	QU-78-45(C)	2.32	24.35	35.07	38.26	5.22	10,356	
385	QU-78-46(C)	2.12	17.18	37.96	42.74	6.62	10,354	
389	QU-78-49(C)	2.22	10.37	39.85	47.56	2.52	12,476	
392	QU-78-50(C)	2.38	10.83	38.53	48.26	2.72	12,316	
394	QU-78-52(C)	2.15	19.35	37.04	41.46	3.18	11,007	
396	QU-78-55(C)	2.12	23.10	38.22	36.56	2.86	10,469	
418	QU-78-36(C)	2.28	16.71	37.19	43.82	2.38	11,351	

SUMMARY OF SEAM #1N

CORE ANALYSIS

Lab No.	Corehole No.	Moisture	Ash	Volatile Matter	Fixed Carbon	Sulphur	BTU/lb.	F.S.I.
210	QU-78- 4(C)	2.40	11.87	37.32	48.41	1.19	12,077	1
211	QU-78- 1(C)	2.47	10.61	36.85	50.07	0.95	12,228	1
312	QU-78- 6(C)	2.67	14.98	35.80	46.55	0.90	11,388	1
315	QU-78- 9(C)	2.71	11.48	36.98	48.83	0.56	11,966	1½
317	QU-78- 13(C)	2.75	11.41	35.97	49.87	0.46	12,000	1½
319	QU-78- 16(C)	2.76	8.31	38.10	50.83	0.84	12,481	1½
321	QU-78- 21(C)	2.79	12.23	36.64	48.34	0.44	11,677	1½
324	QU-78- 27(C)	2.79	10.53	37.00	49.68	0.50	12,093	1½
328	QU-78- 30(C)	2.65	9.17	38.07	50.11	1.10	12,424	1½
330	QU-78- 31(C)	3.30	8.53	37.74	50.43	0.56	12,452	1
380	QU-78- 39(C)	3.30	8.25	36.80	51.65	0.79	12,465	1½
382	QU-78- 44(C)	2.68	10.68	36.74	49.90	0.82	11,999	1
384	QU-78- 45(C)	3.05	10.35	37.27	49.33	1.34	12,035	1
386	QU-78- 46(C)	3.06	9.83	37.73	49.38	0.40	12,104	1½
415	QU-78- 58(C)	3.15	11.83	36.53	48.49	0.46	11,789	1
416	QU-78- 79(C)	3.41	13.27	38.77	47.91	0.31	11,271	1½
408	QU-78- 67(C)	2.72	12.77	36.95	47.56	0.38	11,901	1
417	QU-78- 92(C)	3.10	10.83	36.09	49.98	0.61	11,880	1½
419	QU-78- 36(C)	3.09	9.45	38.28	49.18	0.33	12,207	1
421	QU-78- 96(C)	3.11	13.19	35.07	48.62	0.73	11,489	1½
430	QU-78-104(C)	2.83	12.49	36.26	48.41	0.86	11,636	1½
431	QU-78-112(C)	2.86	12.15	36.46	48.53	0.62	11,665	1
498	QU-78-109(C)	3.49	10.37	35.70	50.68	0.45	12,114	1
508	QU-78-114(C)	3.19	20.22	34.03	42.56	1.18	10,569	½
503	QU-78-134(C)	3.53	9.26	36.05	51.16	0.48	12,275	1
507	QU-78-137(C)	3.68	16.67	31.22	48.43	1.08	11,069	½
511	QU-78- 71(C)	2.80	9.76	36.56	50.88	0.51	12,130	1
512	QU-78- 71(C)	2.69	11.58	35.06	50.66	0.32	11,775	1
596	QU-78-141(C)	3.85	13.01	35.29	47.85	1.74	11,632	1

CORE ANALYSIS

Lab No.	Corehole No.	Moisture	Ash	Volatile Matter	Fixed Carbon	Sulphur	BTU/lb.	F.S.I.
387	QU-78- 47(C)	2.69	14.75	37.67	44.89	0.78	11,361	
388	QU-78- 49(C)	3.05	11.23	36.81	48.91	0.45	11,891	
391	QU-78- 50(C)	3.19	8.12	37.77	50.92	0.46	12,470	
393	QU-78- 52(C)	3.08	10.80	37.53	48.59	0.36	11,965	
395	QU-78- 55(C)	3.14	10.87	36.63	49.36	0.64	11,965	
	QU-78- 1(C)	1.82	16.25	34.47	47.46	0.39	11,375	
	QU-79- 2(C)	1.68	12.51	35.39	50.42	0.66	12,043	
	QU-79- 3(C)	1.78	20.21	33.30	44.71	0.41	10,786	
	QU-79- 4(C)	1.80	17.30	35.37	45.53	2.81	11,500	
	QU-79- 5(C)	1.63	26.64	32.53	39.20	1.28	9,646	
	QU-79- 6(C)	1.58	19.82	30.44	48.16	2.20	10,768	
	QU-79- 8(C)	1.77	13.18	35.75	49.30	0.58	11,920	

SUMMARY OF SEAM #1S

CORE ANALYSIS

Lab No.	Corehole No.	Moisture	Ash	Volatile Matter	Fixed Carbon	Sulphur	BTU/lb.	F.S.I.
533	QU-78-148(C)	3.20	10.37	37.48	48.95	0.92	12,204	1
539	QU-78-153(C)	3.02	13.27	36.33	47.80	1.08	11,854	1
552	QU-78-163(C)	3.22	10.90	36.65	49.23	1.32	12,152	1½
590	QU-78-179(C)	2.80	18.62	33.07	45.51	0.88	10,942	1
591	QU-78-192(C)	2.54	26.71	31.34	39.42	1.51	9,677	1½
592	QU-78-198(C)	2.72	25.75	30.49	41.04	0.56	9,750	1
589	QU-78-202(C)	2.93	16.29	34.07	46.71	0.54	11,243	1½
602	QU-78-208(C)	2.47	22.76	35.85	38.92	0.73	10,000	1
616	QU-78-213(C)	2.78	16.01	35.25	45.95	1.50	11,542	1½
618	QU-78-215(C)	2.55	19.69	34.11	43.65	0.75	10,807	1
	QU-79- 7(C)	1.63	20.88	34.33	43.16	1.07	10,766	
	QU-79- 9(C)	1.60	16.12	35.81	46.47	1.14	11,525	
	QU-79- 12(C)	1.51	21.31	32.84	44.34	1.03	10,673	
	QU-79- 28(C)	1.92	15.99	36.83	45.26	1.73	12,338	
	QU-79- 30(C)	1.10	16.73	35.25	46.92	0.81	11,784	

SUMMARY OF SEAM #2

CORE ANALYSIS

Lab No.	Corehole No.	Moisture	Ash	Volatile Matter	Fixed Carbon	Sulphur	BTU/lb.	F.S.I.
313	QU-78- 9(C)	1.74	31.65	34.57	32.04	4.42	8,950	
402	QU-78- 58(C)	2.70	14.47	38.56	44.27	2.11	11,685	
406	QU-78- 67(C)	2.78	13.54	37.74	45.94	2.22	11,805	
409	QU-78- 79(C)	2.90	9.49	39.18	48.43	1.32	12,345	
412	QU-78- 92(C)	2.87	14.52	37.26	45.34	1.51	11,566	
420	QU-78- 96(C)	3.22	14.22	37.22	45.34	2.08	11,660	
422	QU-78-104(C)	3.03	11.26	36.93	48.78	1.98	12,045	
426	QU-78-112(C)	2.62	16.44	38.71	42.23	1.85	11,380	
496	QU-78-109(C)	1.99	12.65	38.28	47.08	1.94	11,717	
504	QU-78-137(C)	3.34	11.49	37.02	48.15	1.70	12,153	
509	QU-78- 71(C)	3.32	14.38	36.52	45.78	2.06	11,545	
582	QU-78-192(C)	2.83	11.23	38.73	47.21	3.20	12,490	
585	QU-78-198(C)	3.10	10.09	37.25	49.56	2.18	12,456	
588	QU-78-202(C)	3.12	10.05	36.30	50.53	2.69	12,437	
593	QU-78-141(C)	3.94	14.81	34.85	46.40	0.65	11,110	
603	QU-78-213(C)	2.54	23.60	35.07	38.79	3.28	10,188	1½
617	QU-78-215(C)	2.86	13.63	35.49	48.02	1.94	11,978	1
615	QU-78-228(C)	4.39	12.59	38.47	44.55	1.46	11,465	
593	QU-78-141(C)	3.71	14.54	36.71	45.04	1.64	11,358	
	QU-79- 6(C)	1.58	21.47	33.31	43.64	0.56	10,725	
	QU-79- 12(C)	1.35	19.68	36.01	42.96	3.63	11,166	
	QU-79- 28(C)	1.41	24.99	33.97	39.63	4.75	10,110	
	QU-79- 30(C)	0.98	24.22	35.54	39.26	3.12	10,355	
	QU-79-33(C)	1.41	20.72	35.82	42.32	2.52	10,720	

SUMMARY OF SEAM #3

CORE ANALYSIS

Lab No.	Corehole No.	Moisture	Ash	Volatile Matter	Fixed Carbon	Sulphur	BTU/lb.	F.S.I.
554	QU-78-148(C)	3.04	10.93	38.00	48.03	2.26	12,147	1
555	QU-78-153(C)	2.75	15.07	36.52	45.66	3.26	11,644	1½
556	QU-78-157(C)	3.09	21.42	43.74	40.75	2.07	10,359	1
546	QU-78-158(C)	2.34	16.68	35.33	45.65	3.92	11,332	1
557	QU-78-163(C)	2.76	13.47	37.00	46.77	3.82	11,665	1½
553	QU-78-165(C)	3.03	10.60	38.74	47.63	3.04	12,183	1
619	QU-78-217(C)	2.35	33.34	31.24	33.07	2.61	8,990	1
620	QU-78-228(C)	1.63	31.25	33.03	34.09	2.62	9,343	1
651	QU-78-243(C)	1.49	15.97	37.01	45.53	5.50	11,813	1½
645	QU-78-254(C)	1.29	16.02	37.75	44.94	5.50	11,800	3
648	QU-78-258(C)	1.41	13.11	37.75	47.73	3.13	12,290	2
649	QU-78-267(C)	1.65	18.78	36.60	42.97	3.40	11,322	1
650	QU-78-267(C)	1.74	29.89	34.00	34.37	2.42	9,400	1
678	QU-78-324(C)	1.76	22.57	35.36	40.31	3.84	10,679	1½
673	QU-78-324(C)	1.72	20.24	35.61	42.43	0.88	10,490	1½
675	QU-78-324(C)	1.65	20.68	35.91	41.76	0.89	10,393	1½
	QU-78- 10(C)	1.59	10.00	39.04	49.37	2.96	12,595	
	QU-78- 14(C)	1.86	22.50	32.85	42.79	1.09	10,295	
	QU-78- 16(C)	1.71	26.56	33.02	38.71	1.49	9,939	
	QU-78- 18(C)	0.97	23.21	34.26	41.56	0.95	10,413	
	QU-79- 19(C)	0.99	18.80	35.17	45.04	1.17	11,120	
	QU-79- 20(C)	0.99	24.94	33.46	40.61	1.56	10,057	
	QU-79- 22(C)	0.82	31.80	30.78	36.60	1.73	8,960	
	QU-79- 26(C)	0.97	28.44	36.01	34.58	1.66	9,497	
	QU-79- 32(C)	0.89	32.29	29.41	37.41	3.18	9,224	
	QU-79- 34(C)	0.88	33.99	28.69	36.44	3.80	8,900	
	QU-79- 36(C)	1.06	23.13	34.83	40.98	2.60	10,731	
	QU-79- 37(C)	1.01	19.00	37.52	42.47	2.82	11,406	
	QU-79- 39(C)	0.91	26.31	31.25	41.53	3.14	10,364	
	QU-79- 11(C)	1.43	18.46	35.32	44.79	3.76	11,317	
	QU_79- 17(C)	1.75	25.29	31.90	41.06	1.01	10,052	
	QU-79-13(C)	1.82	18.31	33.05	46.82	1.02	11,009	
	QU-79-15(C)	1.81	16.11	33.35	48.73	1.58	11,293	

SUMMARY OF SEAM #4

CORE ANALYSIS

Lab No.	Corehole No.	Moisture	Ash	Volatile Matter	Fixed Carbon	Sulphur	BTU/lb.	F.S.I.
	QU-79- 16(C)	1.45	27.36	32.98	38.21	3.74	9,850	
	QU-79- 18(C)	1.68	23.65	34.85	39.82	4.42	10,410	
	QU-79- 26(C)	0.86	34.71	30.59	33.84	2.86	8,690	
	QU-79-324(C)	1.76	22.57	35.36	40.31	3.84	10,679	

SUMMARY OF SEAM No. 1

CORE ANALYSIS ON 6% MOISTURE

Hole No.	Ash	Volatile Matter	Fixed Carbon	Sulphur	BTU/lb.
QU-78-6c	21.44	35.04	37.53	7.96	9925
QU-78-9c	19.02	36.27	38.62	2.89	10188
QU-78-13c	20.85	36.10	37.05	2.89	9966
QU-78-16c	19.50	35.21	39.29	5.95	10364
QU-78-21c	21.27	35.41	38.31	5.44	10079
QU-78-27c	17.71	35.24	41.06	4.51	10844
QU-78-30c	13.26	38.40	42.35	2.79	10988
QU-78-31c	20.75	36.26	36.98	8.24	10377
QU-78-39c	14.36	35.57	44.07	3.02	11349
QU-78-44c	28.08	32.71	33.22	5.90	8991
QU-78-45c	24.43	33.75	36.82	5.02	9966
QU-78-46c	16.50	36.46	41.05	6.36	9944
QU-78-49c	9.97	38.31	45.72	2.42	11994
QU-78-50c	10.43	37.10	46.47	2.62	11859
QU-78-52c	18.59	35.58	39.83	3.05	10574
QU-78-55c	22.18	36.70	35.11	2.75	10054
QU-78-36c	16.07	35.77	42.15	2.29	10919
QU-76-4c	11.13	37.49	45.38	3.35	11798
QU-76-3c	14.05	36.94	43.02	2.45	11562
QU-76-5c	24.09	33.38	36.53	0.39	9793
QU-76-6c	19.51	36.68	37.81	2.80	10468

SUMMARY OF SEAM No. 1N

CORE ANALYSIS ON 6% MOISTURE

Hole No.	Ash	Volatile Matter	Fixed Carbon	Sulphur	BTU/lb.
QU-78-4c	11.43	35.94	46.62	1.15	11631
QU-78-1c	10.23	35.52	48.26	0.92	11785
QU-78-6c	14.47	34.58	44.96	0.87	10998
QU-78-9c	11.09	35.73	47.18	0.54	11561
QU-78-13c	11.03	34.77	48.20	0.44	11598
QU-78-16c	8.03	36.83	49.14	0.81	12065
QU-78-21c	11.83	35.43	46.74	0.43	11291
QU-78-27c	10.18	35.78	48.04	0.48	11694
QU-78-30c	8.85	36.76	48.39	1.06	11996
QU-78-31c	8.29	36.69	49.02	0.54	12104
QU-78-39c	8.02	35.77	50.21	0.77	12117
QU-78-44c	10.32	35.49	48.20	0.79	11589
QU-78-45c	10.04	36.14	47.83	1.30	11669
QU-78-46c	9.53	36.59	47.88	0.39	11737
QU-78-58c	11.48	35.46	47.06	0.45	11442
QU-78-79c	12.91	37.73	46.63	0.30	10969
QU-78-67c	12.34	35.70	45.96	0.37	11500
QU-78-92c	10.51	35.01	48.48	0.59	11524
QU-78-36c	9.17	37.13	47.70	0.32	11840
QU-78-96c	12.80	34.02	47.17	0.71	11146
QU-78-104c	12.08	35.08	46.83	0.83	11256
QU-78-112c	11.76	35.28	46.96	0.60	11288
QU-78-109c	10.10	34.77	49.36	0.44	11799
QU-78-114c	19.63	33.04	41.32	1.15	10262
QU-78-134c	9.02	35.13	49.85	0.47	11961
QU-78-137c	16.27	30.47	47.26	1.05	10802
QU-78-71c	9.44	35.36	49.20	0.49	11731
QU-78-71c	11.19	33.87	48.94	0.31	11374
QU-78-141c	12.72	34.50	46.78	1.70	11372
QU-78-47c	14.25	36.39	43.36	0.75	10975
QU-78-49c	10.89	35.69	47.42	0.44	11529
QU-78-50c	7.88	36.67	49.44	0.45	12108
QU-78-52c	10.47	36.40	47.13	0.35	11605
QU-78-55c	10.55	35.55	47.90	0.62	11612
QU-79-1c	15.56	33.00	45.44	0.37	10891
QU-79-2c	11.96	33.84	48.20	0.63	11514
QU-79-3c	19.34	31.87	42.79	0.39	10323
QU-79-4c	16.56	33.86	43.58	2.69	11008
QU-79-5c	25.46	31.08	37.46	1.22	9217
QU-79-6c	18.93	29.07	46.00	2.10	10284
QU-79-8c	12.61	34.21	47.18	0.56	11407
QU-76-1c	15.38	33.41	45.20	0.26	11010
QU-76-2c	20.09	32.18	41.73	0.10	10429
QU-76-3c	9.56	36.00	48.36	0.19	12213
QU-76-4c	9.76	36.35	47.90	0.29	11967
QU-76-5c	11.17	35.18	47.67	0.26	11698
QU-76-6c	12.78	35.01	46.22	0.33	11514
QU-76-11c	15.63	33.46	44.90	0.27	11147

SUMMARY OF SEAM No. 1 South

CORE ANALYSIS ON 6% MOISTURE

Hole No.	Ash	Volatile Matter	Fixed Carbon	Sulphur	BTU/lb.
QU-78-148c	10.07	36.40	47.53	0.89	11851
QU-78-153c	12.86	35.21	46.33	1.05	11490
QU-78-163c	10.59	35.60	47.82	1.28	11803
QU-78-179c	18.01	31.98	44.01	0.85	10582
QU-78-192c	25.76	30.23	38.02	1.46	9334
QU-78-198c	24.88	29.46	39.66	0.54	9421
QU-78-202c	15.77	32.99	45.23	0.52	10887
QU-78-208c	21.94	34.55	37.51	0.70	9638
QU-78-213c	15.48	34.08	44.43	1.45	11160
QU-78-215c	18.99	32.90	42.10	0.72	10424
QU-79-7c	19.95	32.80	41.24	1.02	10288
QU-79-9c	15.40	34.21	44.39	1.09	11010
QU-79-12c	20.34	31.34	42.32	0.98	10186
QU-79-28c	15.32	35.30	43.38	1.66	11825
QU-79-30c	15.90	33.50	44.60	0.77	11200
QU-76-9c	19.87	33.85	40.28	1.37	10530
QU-77-33c	20.59	32.24	41.18	0.55	10196
QU-77-32c	16.80	34.41	42.79	1.17	11039
QU-77-34c	22.70	30.09	39.21	0.47	9652
QU-77-50c	19.65	31.07	43.28	1.06	10059
QU-77-60c	28.05	32.58	39.44	1.62	10063

SUMMARY OF SEAM No. 2

CORE ANALYSIS ON 6% MOISTURE

Hole No.	Ash	Volatile Matter	Fixed Carbon	Sulphur	BTU/lb.
QU-78-9c	30.28	33.07	30.65	4.23	8562
QU-78-58c	13.98	37.25	42.77	2.04	11289
QU-78-67c	13.09	36.49	44.42	2.15	11414
QU-78-79c	9.19	37.93	46.88	1.28	11951
QU-78-92c	14.05	36.06	43.88	1.46	11193
QU-78-96c	13.81	36.15	44.04	2.02	11325
QU-78-104c	10.92	35.80	47.29	1.92	11676
QU-78-112c	15.87	37.37	40.76	1.79	10985
QU-78-109c	12.13	36.71	45.15	1.86	11238
QU-78-137c	11.17	36.00	46.82	1.65	11819
QU-78-71c	13.98	35.51	44.51	2.00	11225
QU-78-192c	10.86	37.47	45.67	3.10	12083
QU-78-198c	9.79	36.14	48.08	2.11	12083
QU-78-202c	9.75	35.22	49.03	2.61	12067
QU-78-141c	14.49	34.10	45.40	0.64	10872
QU-78-213c	22.76	33.82	37.41	3.16	9826
QU-78-215c	13.15	34.23	46.32	1.87	11553
QU-78-228c	12.38	37.82	43.80	1.44	11272
QU-78-141c	14.19	35.84	43.97	1.60	11089
QU-79-6c	20.51	31.81	41.68	0.53	10243
QU-79-12c	18.75	34.31	40.94	3.46	10639
QU-79-28c	23.83	32.39	37.78	4.53	9639
QU-79-30c	22.99	33.74	37.27	2.96	10177
QU-79-33c	19.76	34.15	40.35	2.40	10221
QU-76-1c	14.27	37.17	42.56	2.43	11465
QU-76-1c	18.27	36.48	39.25	4.24	10854
QU-76-10c	13.47	35.42	45.12	4.72	11763
QU-77-34c	15.66	35.82	42.52	3.57	11065

SUMMARY OF SEAM No. 3

CORE ANALYSIS ON 6% MOISTURE

Hole No.	Ash	Volatile Matter	Fixed Carbon	Sulphur	BTU/lb.
QU-78-148c	10.60	36.84	46.56	2.19	11776
QU-78-153c	14.57	35.30	44.13	3.15	11255
QU-78-157c	20.78	42.43	39.53	2.01	10048
QU-78-158c	16.05	34.01	43.94	3.77	10907
QU-78-163c	13.02	35.77	45.21	3.69	11276
QU-78-165c	10.28	37.55	46.17	2.95	11810
QU-78-217c	32.09	30.07	31.83	2.51	8654
QU-78-228c	29.86	31.56	32.58	2.50	8926
QU-78-243c	15.24	35.32	43.45	5.25	11272
QU-78-254c	15.26	35.95	42.80	5.24	11237
QU-78-258c	12.50	35.99	45.51	2.98	11718
QU-78-267c	18.78	34.98	41.07	3.25	10821
QU-78-267c	28.59	32.53	32.88	2.32	8992
QU-78-324c	21.60	33.83	38.57	3.67	10218
QU-78-324c	19.36	34.06	40.58	0.84	10033
QU-78-324c	19.77	34.32	39.91	0.85	9933
QU-79-10c	9.55	37.29	47.16	2.83	12031
QU-79-14c	21.55	31.46	40.98	1.04	9861
QU-79-16c	25.40	31.58	37.02	1.42	9505
QU-79-18c	22.03	32.52	39.45	0.90	9884
QU-79-19c	17.85	33.39	42.76	1.11	10557
QU-79-20c	23.68	31.77	38.56	1.48	9548
QU-79-22c	30.14	29.17	34.69	1.64	8492
QU-79-26c	27.00	34.18	32.82	1.58	9015
QU-79-32c	30.63	27.89	35.48	3.02	8748
QU-79-34c	32.23	27.21	34.56	3.60	8440
QU-79-36c	21.98	33.09	38.93	2.47	10195
QU-79-37c	18.04	35.63	40.33	2.68	10831
QU-79-39c	24.96	29.64	39.40	2.98	9832
QU-79-11c	17.60	33.68	42.70	3.59	10792
QU-79-17c	24.20	30.52	39.28	0.97	9617
QU-79-13c	17.53	31.64	44.83	0.98	10540
QU-79-15c	15.42	31.93	46.65	1.51	10811
QU-76-8c	19.84	34.68	39.48	3.22	10650
QU-76-6c	28.05	31.14	34.81	3.40	9313
QU-77-9c	26.16	31.03	36.81	2.88	9703

SUMMARY OF SEAM No. 4

CORE ANALYSIS ON 6% MOISTURE

Hole No.	Ash	Volatile Matter	Fixed Carbon	Sulphur	BTU/lb.
QU-79-16c	26.10	31.46	36.45	3.57	9395
QU-79-18c	22.61	33.32	38.07	4.23	9953
QU-79-26c	32.91	29.00	32.09	2.71	8239
QU-78-324c	21.40	33.53	38.22	3.64	10125